Chapter 10: Sound Waves - Ultimate Puzzle Workbook

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Part 1: The Sound Scramble

Unscramble these essential sound vocabulary words:

1. R A T V I B N O I _____

2. D M E U M I _____

3. U Q E F R N Y E C _____

4. O H C E _____

5. L D G O N U I N T I A _____

Part 2: True or False: The Physics of Sound

1. Sound can travel easily through the vacuum of outer space. (T / F)

2. A larger amplitude means a louder sound. (T / F)

3. Human hearing ranges roughly from 20 Hz to 20,000 Hz. (T / F)

4. An echo requires a minimum distance of about 17 meters to be heard clearly. (T / F)

5. Sound travels much faster in air than it does in solid steel. (T / F)

Part 3: Odd One Out

Circle or highlight the term that does not belong in each group, and think about why!

1. Solid | Liquid | Vacuum | Gas

2. Sonar | Echolocation | Ultrasound | Infrasound

3. Pitch | Frequency | Hertz | Loudness

4. Vocal cords | Tabla membrane | Vacuum pump | Guitar string

Part 4: The Great Sound Crossword

Use the clues below to fill in the crossword grid.

ACROSS
3. The maximum change in density; determines the loudness of sound.
4. Sound waves with frequencies above 20 kHz.
5. The distance between two consecutive crests or troughs.

DOWN
1. The persistence of sound in an auditorium due to multiple reflections.
2. How the human ear perceives frequency (high or low).

Part 5: Word Search: Waves & Frequencies

Find the following words hidden in the grid: FREQUENCY, VACUUM, LOUDNESS, COCHLEA, DECIBEL, SONAR, PITCH, ECHO

F	R	E	Q	U	E	N	C	Y	M	A	Z
P	V	A	C	U	U	M	X	B	E	N	T
L	O	U	D	N	E	S	S	Q	D	C	Q
A	C	O	C	H	L	E	A	M	I	X	L
P	D	E	C	I	B	E	L	Z	U	V	P
R	A	R	E	F	A	C	T	I	O	N	S
V	I	B	R	A	T	I	O	N	L	M	Y
E	N	E	R	G	Y	X	Z	U	P	C	I
A	U	L	T	R	A	S	O	U	N	D	X
P	I	T	C	H	B	A	W	G	Y	M	K
L	O	N	G	I	T	U	D	I	N	A	L
S	O	N	A	R	E	C	H	O	Q	R	S

Part 6: Match the Maker

Match the technology or phenomenon in Column A with its core principle in Column B.

1. Bat Navigation	A. Active Noise Cancellation
2. Kerala Fishing Trawler	B. Reflection of Sound (Whispering Gallery)
3. Gol Gumbaz	C. Echolocation
4. Earphone ANC	D. Sonar (Ultrasonic echoes)
5. Kidney Stone Treatment	E. Lithotripsy (High-energy ultrasound)

Part 7: Fill in the Blanks

1. Sound requires a material _____ to propagate.

2. A sound wave is classified as a _____ wave because particles vibrate parallel to the direction of travel.

3. The number of complete oscillations per unit time is called the _____.

4. A region of lower-than-average density in a sound wave is called a _____.

5. The unit of loudness is the _____ (dB).

Part 8: Math Magic

1. A dholki player produces 10 beats in 2 seconds. What is the frequency in Hz?

2. You hear thunder 3 seconds after seeing lightning. If the speed of sound is 340 m/s, how far away was the strike?

3. A sound wave has a frequency of 100 Hz and a wavelength of 3.4 m. What is its speed? ($v = \lambda \times \nu$)

Part 9: Decode the Secret Message

Use the key (A=1, B=2, C=3... Z=26) to decode the fundamental truth of acoustics:

19 15 21 14 4 14 5 5 4 19 1 13 5 4 9 21 13

_ _

Part 10: The Ultimate Sound Quiz

1. Which organ in the human ear converts vibrations into electrical signals?

a) Eardrum b) Cochlea c) Pinna

2. What is the minimum time gap required between original sound and reflection to hear a distinct echo?

a) 0.05 s b) 0.1 s c) 0.5 s

3. Why do concert halls use sound-absorbing panels?

a) To increase echoes b) To decrease reverberation c) To change the pitch

ANSWER KEY

Part 1
1. VIBRATION, 2. MEDIUM, 3. FREQUENCY, 4. ECHO, 5. LONGITUDINAL

Part 2
1. F (needs a medium), 2. T, 3. T, 4. T (17m is correct), 5. F (fastest in solids like steel)

Part 3
1. Vacuum (no particles), 2. Infrasound (others use ultrasound), 3. Loudness (others relate to frequency), 4. Vacuum pump (does not vibrate to make sound)

Part 4
ACROSS: 3. AMPLITUDE, 4. ULTRASOUND, 5. WAVELENGTH
DOWN: 1. REVERBERATION, 2. PITCH

Part 5
Words are horizontally spelled out in the rows.

Part 6
1-C, 2-D, 3-B, 4-A, 5-E

Part 7
1. medium, 2. longitudinal, 3. frequency, 4. rarefaction, 5. decibel

Part 8
1. 5 Hz (10/2)
2. 1020 meters (340 * 3)
3. 340 m/s (100 * 3.4)

Part 9
SOUND NEEDS A MEDIUM

Part 10
1. b (Cochlea), 2. b (0.1 s), 3. b (To decrease reverberation)